Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

World History (HONORS)

**What’s Needed for a Long Sea Exploration**

*This packet will give an overview of some reasons why Europeans were capable of long voyages in the 15th and 16th centuries. Please read and briefly annotate, and then complete the tasks on the last pages of this packet.*

**Maps:** *Knowing where you are relative to the rest of the world*

• In the fifteenth century, educated people regarded a round earth as common knowledge, despite popular tales about a flat earth.

• Venetian, Florentine, and Genoese mariners had since the Middle Ages sailed regularly across the Mediterranean, Black, and Baltic seas, as well as the coastal waters of the northeastern Atlantic. The most frequented coastlines of these seas, including natural features and ports, were mapped in detail and quite accurately on charts, each one showing a limited area. These portolan charts, as they were known, represented the cumulative experience of mariners, summarized for the benefit of other seafarers. They could be relied on for navigating fairly short passages but were no use for fixing the position of a ship out of sight of land.

• From the Mediterranean region, many Muslims and some Christian Europeans (mostly Italians) made their way in the thirteenth and fourteenth centuries overland to Inner Eurasia, India, Indonesia, and China. Many were merchants in search of products such as spices and silk unavailable at home. Other travelers included diplomats, scholars, and missionaries. Ibn Battuta and Marco Polo were only the best known among many other journeyers. The Mongol empires ensured safe routes. Some travelers left descriptions, not always accurate or full, of their routes and the places they visited.

• European world maps at this time began to pay attention to contemporary experience but often relied at least partly on the Bible to depict the earth’s geographical features. They were far less accurate than the map of the Muslim Arab geographer Idrisi, who had worked at the court of a Christian Norman king in Sicily in the twelfth century.

• In about 1410, two geographical works appeared that heavily influenced European views of the world. One, called Image of the World, was written by a cardinal of the Roman Catholic Church. It drew on the Bible, legends, travelers’ accounts, and classical writers, on whose authority the cardinal affirmed the possibility of reaching the Indies by sailing west. He exaggerated the east-west stretch of Asia and the proportion of land to sea in the area of the globe. Columbus is known to have studied this book. His own calculations made the distance from Europe to Japan less than 3,000 nautical miles. The actual great circle distance is 10,600. The other work was a Latin translation of the Geography by the second-century CE author Ptolemy. It described the world of Ptolemy’s time. It gave a fairly accurate picture of the Roman empire and its neighboring countries. But beyond the area of his knowledge, Ptolemy used guesswork instead of evidence. He described a huge southern continent, attached at one end to Africa and the other to China, making the Indian Ocean a land-locked sea. He stated that navigation was impossible anywhere in the southern hemisphere because of the excessive heat there. And he contradicted the near-to-accurate estimate of the earth’s circumference by an earlier classical author, his own being an underestimate by as much as one-sixth, thus shrinking the size of oceans. Ptolemy continued to have influence on geographical writing into early modern times.

• European cartographers from about 1400 to 1550 usually underestimated the circumference of the earth by about 6,000 miles. Until the late sixteenth century, some of them continued to believe that America was just an extension of Asia. Others thought that Asia lay just barely beyond the lands they had so newly found and that the westward route was therefore much shorter than the one around Africa.

• By the fourteenth century, Chinese maps gave a generally accurate view of the relationships and main features, though not the relative sizes, of the entire area from Korea to the Atlantic edge of Europe. At least two Chinese world maps from the 1300s are known but have not survived except as sources for the Korean world map of 1402. The Kangnido Korean map, drawing on two earlier Chinese maps, shows India at the center combined with a heavily swollen China. Correctly positioned are Korea, Arabia, and the Red Sea. Korea is depicted as about the same size as Africa with an open sea at its tip. Europe is somewhat squashed on the left but shows the Mediterranean and Black seas and names many European countries, including “Alumangia,” an attempt at Alemania, the Latin name for Germany.

• Pilot guides and navigational literature by Muslim writers describing features of seas and shores from the Persian Gulf and the Red Sea to the Asian edges of the Pacific circulated in the fifteenth and sixteenth centuries.

• A Javanese chart of 1512 delineated Portugal, Brazil, the southern tip of Africa, the Red Sea and Persian Gulf, Sumatra, Siam, Java, and the Spice Islands. The first European sailing directions for the region east of India to the Spice Islands, compiled in 1514, were based on Javanese charts.

• European seafarers both East and West in the fifteenth and sixteenth centuries tried hard to find and persuade local pilots to help them navigate.

**Navigation:** *Finding your way from here to there*

• A map showed the location of starting place and intended destination. Knowing the location of one’s ship when between the two and out of sight of land could be a big problem. Two methods helped:

o Experience, based on knowledge by observation of wind and wave patterns, currents, depth of water, color of the sea, kinds of seaweeds, types of fish, clouds, the flight and kinds of birds, and, as often as possible, sightings of known landmarks. In unknown waters and very far from land, these methods were less than satisfactory.

o Fixing location by finding the latitude (the east-west line giving the distance north or south of the equator) based on measuring the altitude (height above the horizon) of the Pole Star, or North Star. At the North Pole, the star is directly overhead at an altitude of 90 degrees, and the location on earth is at ninety degrees latitude. At the equator, the star is right at the horizon, at 0 degrees latitude. In between, the angle of the star above the horizon gives altitude and latitude. For navigation, a pilot would measure the star’s angle before leaving the home port. On the return voyage, the ship would sail north or south until the Pole Star appeared at the same angle as at the home port, then “sail down the latitude” keeping the star at a constant angle. Other stars could be used similarly.

• In the 1480s, when Portuguese mariners first approached and then crossed the equator, they found that the Pole Star disappeared below the horizon. A conference called by the king recommended using the sun’s altitude as replacement, and scholars translated from the Hebrew information about the sun’s seasonal movements that made this possible.

• Arab mariners had long sailed open seas by the stars and knew how to observe heavenly bodies to help fix their position. Their knowledge and instruments of observation had filtered into Western Europe, often through Jewish intermediaries. The compass, invented in China and passed westward through the Muslim lands, was also quickly adopted. By the mid-fifteenth century, celestial observation was still not commonplace, though fairly widely known.

The problem of how to reckon longitude was not solved until the later eighteenth century.

**Guns:** *Protection and aggression*

• With its shot weighing ounces rather than pounds, the cannons mounted on Iberian ships in the fifteenth-century were more useful for killing people than sinking vessels. Placed on deck along the railing or on the castles, ships’ guns could be mounted without major design changes. They had efficient uses against unarmed craft that Iberian mariners met in African and South Asian waters. Large, heavy cannons were already used on land. By the end of the 1400s, naval technicians attempted to adapt these to ships and use them to breach fortifications on shore. These experts solved several problems. They cut down cannon length, tapering the barrels, and casting them from bronze or brass instead of forging them from separate pieces of iron. This saved weight, but the guns retained enough strength to throw stone, iron, or lead balls weighing from five to sixty pounds. Because of their formidable recoil, these guns could not be perched on ship castles. Therefore, they were moved down to the waist of the ship and fired through round holes cut in the gunwales, their recoil controlled with ropes.

• Europeans who went overseas often had to fight. The Portuguese set up fortified commercial bases protected with cannon. In the Indian Ocean region, trained soldiers transported from Portugal served alongside men who were recruited locally. Auxiliaries from the armies of friendly rulers were also used. In preparing for his third expedition to America, Columbus asked the Spanish government for 100 muskets and 100 crossbows for 1200 soldiers, sailors, and settlers, whom he hoped to take with him. Spainish explorer Hernan Cortés took a few light ship cannons with him when he invaded Mexico. He had thirteen muskets for his several hundred men, and he found swords, dogs, and horses the most effective weapons. He and other conquistadors also relied heavily on native allies.

• In both the Americas and the Indian Ocean, the Iberians had a chronic problem of maintaining sufficient numbers of troops. Their own populations were small: about a million in Portugal, and eight times that in Spain. In Asia and America, Iberian forces were almost always overwhelmingly outnumbered. In addition, mortality among Europeans who went overseas was consistently high. During long voyages, they died from hunger, cold, unsanitary conditions, shipwreck, and deficiency diseases like scurvy. On shore, they faced fighting and tropical diseases.

**Maps**

1. In the box below, make a drawing, either symbolic or literal, that shows how 15th century Europeans’ maps represented a **convergence** of global information. (If you *must* write an explanation, ok, you can do that too… but drawing will work your brain better!)

**Navigation**

2. How did means of navigation improve by the 15th century? What led to these improvements? Again, ideally you’d draw your answer… but if you must write it, then so be it. ;)

**Guns**

3. For what purposes did Europeans mariners use guns? Was their use justifiable? Again, ideally you’d draw your answer… but if you must write it, then so be it (especially if you made a valiant effort to draw your previous two answers ☺